LINDA LINGLE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801-3378

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

In reply, please refer to:
EMD / CWB

08015PMT.06d
DATE: August 21, 2006
NPDES PERMIT NO.: HI 0000353
ZONE OF MIXING NO.: ZM-58

FACT SHEET: APPLICATION FOR RENEWAL OF NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT AND ZONE OF MIXING TO DISCHARGE TO PACIFIC OCEAN, WATERS OF THE UNITED STATES

PERMITTEE: KAUAI ISLAND UTILITY COOPERATIVE

FACILITY: PORT ALLEN GENERATING STATION

FACILITY ADDRESS

Kauai Island Utility Cooperative
Port Allen Generating Station
261 Akaula Street
Eleele, Kauai, Hawaii 96705

PERMITTEE MAILING ADDRESS

Kauai Island Utility Cooperative
4463 Pahee Street
Lihue, Kauai, Hawaii 96766
Contact: Mr. H.A. Achenbach
President & C.E.O.
Telephone No. (808) 246-4389

PERMIT STATUS

NPDES Permit No. HI 0000353, including the Zone of Mixing, was issued on May 23, 2001, and expired on March 31, 2006. The Permittee reapplied for an NPDES permit and Zone of Mixing on October 6, 2005. The Department of Health administratively extended the existing NPDES permit, including the Zone of Mixing, on March 14, 2006, pending the reapplication processing. The Permittee submitted amendments to the NPDES application on November 30, 2005, and April 12, 2006.

The Director of Health (Director) proposes to issue a permit to discharge to the waters of the state until March 31, 2011, and has included in the proposed permit those terms and conditions which he has determined are necessary to carry out the provisions of the Federal Clean Water Act, 33 U.S.C. Subsection 1251 et seq., and Chapter 342D, Hawaii Revised Statutes.

FACILITY SETTING

A. Facility Operation and Location

The Kauai Island Utility Cooperative (KIUC) operates the Port Allen Generating Station, an electric generating facility, located at Port Allen, Eleele, Kauai, Hawaii. (See Figure 1 for location of the Port Allen Generating Station.) At the existing 91.1 megawatt (MW) facility, a mix of generating unit types are utilized to meet the Island of Kauai's electrical demand. Table 1 describes the various generating units that are operated at the facility.

Table 1: Port Allen Generating Station
Existing Generating Units

Name & Type of Generating Unit	Base Load Capacity (in MW)
Diesel Generator No. 1	2.00
Diesel Generator No. 2	2.00
Diesel Generator No. 3	2.75
Diesel Generator No. 4	2.75
Diesel Generator No. 5	2.75
Diesel Generator No. 6	7.85
Diesel Generator No. 7	7.85
Diesel Generator No. 8	7.85
Diesel Generator No. 9	7.85
Gas Turbine No. GT-1	17.50
Gas Turbine No. GT-2	22.60
Steam Turbine/Generator No. 1	10.00
Total	93.75

Diesel Generator Nos. 1,2,3,4, and 5, and the two (2) gas turbines are air-cooled. Diesel Generator Nos. 6,7,8, and 9, and the 10 MW steam turbine generator utilizes an once-through cooling water process for its operation (Total 41.4 MW generating capacity). The source water for the once-through cooling water is obtained from four (4) on-site wells. (See Figure 2 for flow diagram of the existing once-through cooling water process.)

Each of the four (4), 240 feet deep wells are equipped with a 3,750 gpm pump. During normal full-power operations at the facility, water from two (2) of the wells (i.e. 10.8 mgd) will flow to serve the steam turbine. Water from a third well (i.e. 5.4 mgd) will be routed for the once-through cooling of the associated diesel units. The remaining fourth well will serve as a standby. The cooling water effluent from the diesel units and the steam turbine are mixed and the combined flow (16.2 mgd) is discharged to the ocean from the existing Outfall Serial No. 001.

The Outfall Serial No. 001 cooling water effluent is discharged from a shoreline outlet located on the side of a 20 to 30-foot vertical cliff. The discharged cooling water exists a 30-inch diameter outfall pipe as a free jet and falls just inland of the shoreline onto a small pocket beach composed of large cobbles. The cooling water then cascades down the cobble beach face and enters the ocean. (See: Figure 3, Layout of the Port Allen Generating Station and cooling water discharge pipe. Figure 4 for Outfall Serial No. 001 cooling water discharge location. The Outfall Serial No. 001 discharge enters Port Allen Bay of the Pacific Ocean at coordinates: Latitude 21°54'06"N and Longitude 159°35'18"W.

Outfall Serial Nos. 002, 003, 004, and 005 intermittently discharges storm water runoff from the facility. The Outfall Serial No. 002 storm water discharge is located at coordinates: Latitude 21°54'10"N and Longitude 159°35'20"W, and enters Hanapepe Bay, Pacific Ocean. The Outfall Serial No. 003 storm water discharge enters Port Allen Bay of the Pacific Ocean and is located at coordinates: Latitude 21°54'08"N, Longitude 159°35'12"W. The Outfall Serial Nos. 004 and 005 storm water discharges also enters Port Allen Bay, Pacific Ocean, and are located at coordinates: Latitude 21°56'20"N, Longitude 159°35'13"W; Latitude 21°54'09"N, Longitude 159°35'16"W, respectively.

B. Receiving Water Classification

The Port Allen Bay, Pacific Ocean receiving waters is designated as "Class A Wet Open Coastal Waters" under Hawaii Administrative Rules (HAR), Section 11-54-6(b)(2)(B). The Hanapepe Bay, Pacific Ocean receiving waters is designated as "Class A Embayment" under HAR, Section 11-54-6(a)(2)(B). Protected beneficial uses of Class A waters include recreation, aesthetic enjoyment, and the protection and propagation of fish, shellfish and wildlife.

C. Zone of Mixing Designation

The KIUC has requested that the existing Zone of Mixing be renewed. The requested Zone of Mixing is for the assimilation of only once-through cooling water discharged from the Port Allen Generating Station. The Zone of Mixing requested is described as that area of Port Allen Bay of the Pacific Ocean off the Kauai coastline which falls within a boundary defined by an area of radius 2,000 feet originating from Outfall Serial No. 001 at coordinates Latitude 21°54'06"N, Longitude 159°35'18"W. The requested Zone of Mixing shall be subject to a western boundary defined by a line which coincides with the position of the Port Allen breakwater. The Zone of Mixing shall be extended vertically from the surface to the ocean bottom (See Figure 5 for map showing the delineation of the proposed Zone of Mixing.)

DESCRIPTION OF THE PRESENT DISCHARGE

A. Outfall Serial No. 001

Following are characteristics of the once-through condenser cooling water obtained from on-site brackish water source wells.

Maximum Cooling Water Flow: 16.2 MGD

Temperature	Winter	Summer
Average	32.3°C	33.6°C
Daily Maximum	41.0°C	41.0°C

Constituent	Concentration (mg/l or as specified)
Biochemical Oxygen Demand (5-day)	< 1.0
Chemical Oxygen Demand	170
Total Organic Carbon	0.9
Total Suspended Solids	9.5
Ammonia (as N)	0.0434
pH (Standard Units)	6.7 to 7.5
Nitrate + Nitrite (as N)	1.945
Nitrogen, Total Organic (as N)	2.318
Oil and Grease	None Detected
Phosphorus (as P), Total	0.1101

Source: NPDES Application Form 2C and amendments dated September 29, 2005, and April 12, 2006.

B. Quality of Discharge

HAR, Chapter 11-54, Specific Water Quality Criteria Parameters

Parameter	Concentration (ug/L)
Total Nitrogen	2318
Ammonia Nitrogen	43.4
Nitrate+Nitrite	1945
Total Phosphorus	110.1
Chlorophyll a	0.073
Turbidity	None Provided
Nonfilterable Residue	None Provided
pH	8.1 Std. Units
Dissolved Oxygen	None Provided
Temperature	33.6 ºC
Salinity	34.9 ppt

Source: Zone of Mixing Application dated October 6, 2005.

C. Receiving Water Monitoring

Table A of Appendix 1 is a compilation of the geometric mean values calculated at each station and depths for the Port Allen Generating Station receiving water monitoring. Table B of Appendix 1 is a compilation of the geometric mean values calculated at each station (depths combined) for the Port Allen Generating Station receiving water monitoring. See Figure 6 and 7 for aerial map showing the location of the Zone of Mixing and receiving water monitoring control stations. The data used for the calculation of the geometric mean values is from the quarterly receiving water monitoring reports for period April 2003 to February 2006.

D. Outfall Serial Nos. 002, 003, 004, and 005 (Storm Water Runoff Discharges)

The NPDES Application Form 2F dated November 30, 2005, identified storm water discharges from the facility may occur from Outfall Serial Nos. 002, 003, 004, and 005. Following is storm water data for samples taken during the storm event of February 26, 2004.

Storm Water Monitoring Results for Outfall Serial Nos. 002 and 003:

Parameter	**Outfall Serial No. 002 Maximum Values, mg/l or otherwise specified**	**Outfall Serial No. 003 Maximum Values, mg/l or otherwise specified**
Oil & Grease	6.8	8.2

Parameter	**Outfall Serial No. 002 Maximum Values, mg/l or otherwise specified**	**Outfall Serial No. 003 Maximum Values, mg/l or otherwise specified**
Biological Oxygen Demand (BOD_5)	3.7	1.9
Chemical Oxygen Demand (COD)	30.8	23.1
Total Suspended Solids (TSS)	63.3	9.6
Total Nitrogen	2.08	1.15
Total Phosphorus	0.23	0.21
pH	8.3	8.6
Arsenic	21.3 ug/l	None Detected
Copper	28.8 ug/l	26.5 ug/l
Lead	6.23 ug/l	2.36 ug/l

Source: NPDES Application Form 2F dated November 30, 2005.

Storm Water Monitoring Results for Outfall Serial Nos. 004 and 005:

Parameter	Outfall Serial No. 004 Maximum Values, mg/l or otherwise specified	Outfall Serial No. 005 Maximum Values, mg/l or otherwise specified
Oil & Grease	18.7	< 5.0
Biological Oxygen Demand (BOD_5)	6.1	5.4
Chemical Oxygen Demand (COD)	23.1	15.4
Total Suspended Solids (TSS)	81.0	24.0
Total Nitrogen	1.37	0.88
Total Phosphorus	0.14	0.26
pH	8.4	8.2
Arsenic	17.3 ug/l	None Detected
Copper	28.4 ug/l	143 ug/l
Lead	3.2 ug/l	5.43 ug/l

Source: NPDES Application Form 2F dated November 30, 2005.

PROPOSED DETERMINATIONS

A. Effluent Limitations and Monitoring Requirements

1. Once-through Cooling Water Discharges From Outfall Serial No. 001

The proposed effluent limitations are based on the effluent guidelines and standards specified in the 40 Code of Federal Regulations (CFR), Part 423, Steam Electric Power Generating Point Source Category, Revised as of July 1, 2004. The Best Practicable Control Technology currently available (BPT) and Best Available Technology Economically Achievable (BAT) guidelines were applied to establish the proposed limitations. No Best Conventional Pollutant Control Technology (BCT) guidelines have been currently established, therefore the conventional pollutants effluent limits were based on the BPT guidelines. The Department of Health reserves the right to modify the permit to reflect BCT guidelines effluent limitations, as applicable.

The application of the 40 CFR 423 effluent guidelines were made based upon the type of wastewater streams that are being discharged from the facility into state waters. The following table summarizes the application of the effluent guidelines for the wastewater streams from the Port Allen Generating Station:

Wastewater Stream	EVALUATION (Is waste subject to discharge?)	DETERMINATION (Is effluent limitation required?)
Low Volume Wastes (LVW)	No	No
Fly Ash and Bottom Ash	No	No
Metal Cleaning Wastes (MCW)	No	No
Chemical Metal Cleaning Wastes (CMCW)	No	No
Once Through Cleaning Water	Yes	Yes
Cooling Tower Blowdown	No	No
Free Available Chlorine	No	No
Total Residual Chlorine	No	No
pH	No	No
Coal Pile Storm Water Runoff	No	No

The cooling water flow and temperature limits are established based on the previous issued NPDES permit requirements for the operation of the Diesel Generator Units Nos. 6,7,8, and 9, and the steam turbine. Since no chlorination is performed at this facility the BAT limit for free available chlorine was not imposed and instead a "no discharge of chlorine" clause was included. Furthermore, no cooling tower is used at the facility.

The proposed whole-effluent toxicity limitation and monitoring requirements are incorporated into the draft permit in accordance to the EPA national policy on water quality-based permit limits for toxic pollutants issued on March 9, 1984 (49 FR 9016), Section 308 of the Clean Water Act, as amended, and Section 11-54-4(b)(4)(B), HAR. For the KIUC discharge without submerged outfalls a limitation of 70 % mean fertilization (or equivalent chronic test endpoint) of the test organisms (i.e., *Tripneustes gratilla*) in 100 % effluent is proposed. This chronic toxicity test requirement is considered by the Department and EPA

Region 9 to be a more conservative/protective limitation than the acute toxicity criteria of 80 % survival in 100 % effluent established at HAR, Section 11-54-4(b)(4)(B), In addition, the proposed whole-effluent toxicity requirements are established based on comments from the EPA Region 9 Laboratories staff of April 2005 and program consistency with the Draft National Whole Effluent Toxicity Implementation Guidance dated November 2004. Particularly, the proposed whole-effluent toxicity limitation is also based upon program consistency considerations of the limitation with that of the methods protocol mean control test results requirements. The proposed whole-effluent toxicity requirements temporarily requires the testing to be conducted using the currently one (1) only suitable locally available test species, i.e., *Tripneustes gratilla*. Alternatively, upon obtaining written approval from the Director, the Permittee may conduct chronic toxicity testing on one (1) mainland species found in the EPA Methods manual entitled Short-Term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to West Coast Marine and Estuarine Organism (EPA-600-R-95-136, August 1995 or subsequent editions).

No discharges of LVW, Fly Ash and Bottom Ash, MCW, CMCW, and Storm Water Runoff from Coal Pile are made the facility. The LVW, Fly Ash and Bottom Ash, and MCW are disposed by injection well. No CMCW is generated, and no coal is used at the facility. Accordingly, a "no discharge of LVW, Fly Ash and Bottom Ash, MCW, and CMCW" clause is included in the draft permit.

The effluent monitoring for flow, temperature, and WET are required to evaluate compliance with the applicable discharge limitations. Instruction for the Whole-effluent toxicity monitoring is specified at Part B of the permit.

The operation of the four (4) diesel engine generators presents the possibility that oil and grease (O&G) may be discharged. The Basic Water Quality Standards contains O&G provisions under Section 1.b of the Standard NPDES Permit Conditions. The O&G monitoring frequency of monthly is maintained as established by the previous issued permit to evaluate compliance with the Standard NPDES Permit O&G conditions. The monthly frequency is currently considered to be the minimum required to detect O&G and thereby ensure the proper operation and maintenance of the machinery.

The effluent requirement of monitoring only has been included for total nitrogen, ammonia nitrogen, nitrate + nitrite nitrogen, total phosphorus, pH, and salinity to enable comparison with receiving water Zone of Mixing monitoring results.

The effluent requirement of monitoring only for silica will assist data interpretation and evaluation of nutrients in the receiving waters. Silica is abundantly found in Hawaiian igneous rocks. Accordingly, silica is normally present in Hawaii's groundwater. The monitoring for silica has been commonly performed in Hawaii to assess the influence of groundwater dynamics on nearshore waters. The test for silica will provide data to evaluate the net contribution of the Port Allen Generating Station discharge on the receiving waters. The analysis may identify other sources of nutrients that are significant contributors toward the overall ambient receiving water quality.

The proposed once-through cooling water effluent limitations and monitoring

requirements are specified at Part A.1 of the draft permit.

2. Effluent Limitations and Monitoring Requirements for Storm Water Runoff Discharges from **Outfall Serial Nos. 002, 003, 004, and 005**.

   The proposed storm water runoff discharge conditions and requirements are established based on the HAR, Chapter 11-55, NPDES General Permit for Storm Water Associated With Industrial Activities.

   The proposed storm water limitations and monitoring requirements are specified at Part A.2 of the draft permit.

B. Proposed Receiving Water Limitations

The evaluation and determination of receiving water quality is based on Hawaii Administrative Rules, Title 11, Department of Health, Chapter 54, Water Quality Standards (promulgated October 2, 2004).

1. Basic Water Quality Criteria Applicable to All Waters

   a. The discharge shall not cause a violation of any applicable water quality standard for receiving waters adopted by the Water Quality Act of 1987 (P.L. 100-4) and regulation adopted thereunder.

   b. The discharge from the Port Allen Generating Station shall not interfere with the attainment or maintenance of that water quality which assures protection of public water supplies and the protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife and allows recreational activities in and on the water.

2. Specific Criteria "Class A Wet Open Coastal Water"

The Outfall Serial No. 001 once-through cooling water discharge enters the Port Allen Bay, Pacific Ocean a Class A Wet Open Coastal Water. The Class A Wet Open Coastal Water specific water quality criteria under Section 11-54-6(b)(3), HAR is set forth in the table below.

Parameter	Geometric mean not to exceed the given value	Not to exceed the given value more than 10% of the time	Not to exceed the given value more than 2% of the time
Total Nitrogen (ug N/L)	150.00	250.00	350.00
Ammonia Nitrogen (ug NH^4-N/L)	3.50	8.50	15.00
Nitrate + Nitrite Nitrogen (ug ($N0_3$ + NO^2)-N/L)	5.00	14.00	25.00
Total Phosphorus (ug P/L)	20.00	40.00	60.00
Chlorophyll a (ug/l)	0.30	0.90	1.75
Turbidity (N.T.U.)	0.50	1.25	2.00

pH Units - shall not deviate more than 0.5 standard units from a value of 8.1, except at coastal locations where and when freshwater from stream, stormdrain or groundwater discharge may depress the pH to a minimum level of 7.0.
Dissolved Oxygen - Not less than 75 % saturation.
Temperature - shall not vary more than 1°C from ambient conditions.
Salinity - shall not vary more than 10 % from natural or seasonal changes considering hydrologic input and oceanographic factors.

The discharge from Outfall Serial No. 001 shall comply with the water quality criteria set forth in the table above, except that the specific water quality criteria for the parameters listed below may be exceeded within the Zone of Mixing.

Total Nitrogen
Ammonia Nitrogen
Nitrate + Nitrite
Total Phosphorus
Chlorophyll a
pH
Temperature
Salinity

C. Zone of Mixing (ZM-58)

For the assimilation of the existing Port Allen Generating Station discharge in the "Class A" "Wet" "Open Coastal Waters", a Zone of Mixing per Chapter 11-54-9 has been established.

The establishment of this Zone of Mixing is subject to the conditions specified at Part C of the draft permit. Basically, the draft permit maintains the receiving water monitoring as established by the previous issued NPDES permit. The Department presently has determined that the proposed receiving water monitoring requirements constitutes the conditions necessary to evaluate compliance of the Outfall Serial No. 001 discharge with the water quality criteria. This includes the monitoring for silica which will provide data toward the evaluation of the receiving waters. The benthic monitoring requirement is incorporated into the draft permit in accordance with HAR, Section 11-54-9(c)(6)(C). The existing benthic monitoring requirement is maintained in the draft permit toward ensuring that no lowering in the quality of the bottom biological communities is occurring.

D. Other Requirements

1. The proposed schedule of submission at Part E of the draft permit specified the Permittee to submit the following items by the specified time frames to the Director:

    a. Effluent Monitoring Program within 30 days after the effective date of the permit.

    b. Receiving Water Monitoring Program within 30 days after the effective date of the permit.

    c. Annual summary of the quantities of all chemicals, listed by both chemical and trade names, which are used for cooling and/or boiler water treatment and which are discharged by January 30 of each year.

    d. Receiving water bottom biological communities monitoring program within 60 days after the effective date of the permit.

    e. Whole-Effluent Toxicity Initial Investigation Toxicity Reduction Evaluation Workplan within 90 days after the effective date of the permit.

    f. Updated Storm Water Pollution Control Plan within 90 days after the effective date of the permit.

2. Section 316(a) Clean Water Act Assessment, Thermal Effects Report

   The proposed condition to conduct an assessment of the thermal discharge is incorporated into the permit pursuant to implementing the mandates under Section 316(a) of the Clean Water Act, as amended. The proposed Section 316(a) thermal discharge assessment requirement is specified at Part E.2 of the draft permit.

   The Permittee submitted a proposed thermal effects monitoring program dated May 2001, toward compliance with Part E.2.b.(1) of the current effective permit. The Permittee conducted thermal effects monitoring based on the May 2001 proposed program. However, the Department of Health, with the assistance of the EPA, has determined that additional program elements are required to be incorporated into thermal effects monitoring program. Accordingly, the proposed 316(a) requirements in the draft permit specifies that the Permittee submit a revised thermal effects monitoring program in order to incorporate the additional program elements provided in Appendix 2 of this Fact Sheet. The Permittee shall submit the revised thermal effects monitoring program within 120 days after the effective date of the permit.

3. Section 316(b) Clean Water Act Phase II Cooling Water Intake Structure(s) Application Submittal Requirements.

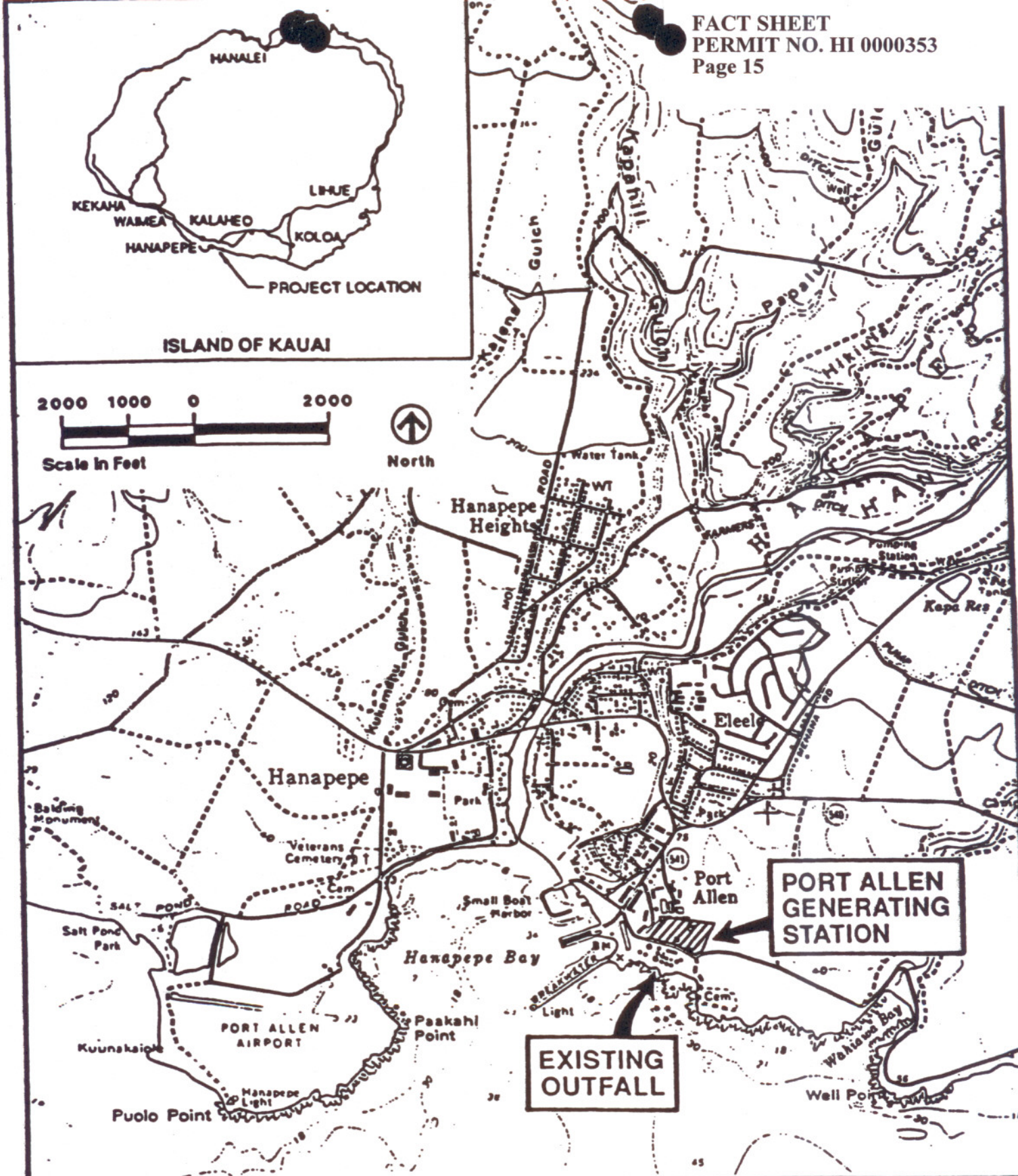
   No Section 316(b) Clean Water Act Phase II cooling water intake structure(s) requirements are incorporated into the draft permit since no cooling water intake structure is used as part of the operation of the facility. The source for the once-through cooling water used at the facility is obtained from the brackish water wells constructed at the facility site.

OCEAN DISCHARGE CRITERIA

The Director has considered the Ocean Discharge Criteria, established pursuant to Section 403(c) of the Clean Water Act for the discharge of pollutants into the territorial sea, the waters of the contiguous zone, or the oceans. The EPA has promulgated regulations for Ocean Discharge Criteria in 40 Code of Federal Regulations Part 125, Subpart M. Therefore, the Director has determined that the discharge will not cause unreasonable degradation to the marine environment. Based on current information, the Director proposes to issue a permit.

KAUAI ISLAND UTILITY COOPERATIVE
PORT ALLEN GENERATING STATION
NPDES PERMIT NO. HI 0000353
ZONE OF MIXING NO. ZM-58

APPENDIX 1



Location of the Port Allen Generating Station

FIGURE 1

Cooling
Water System

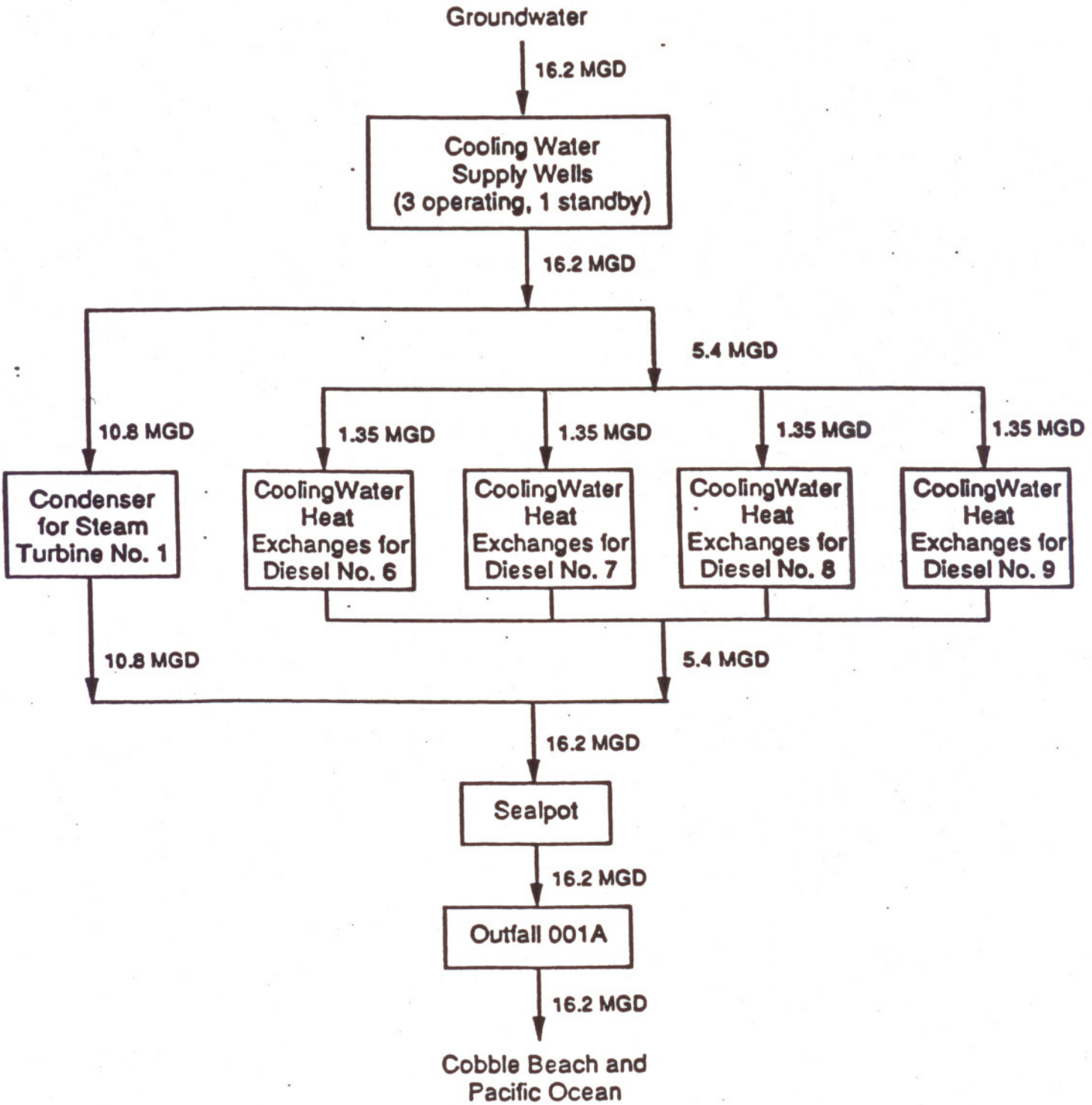
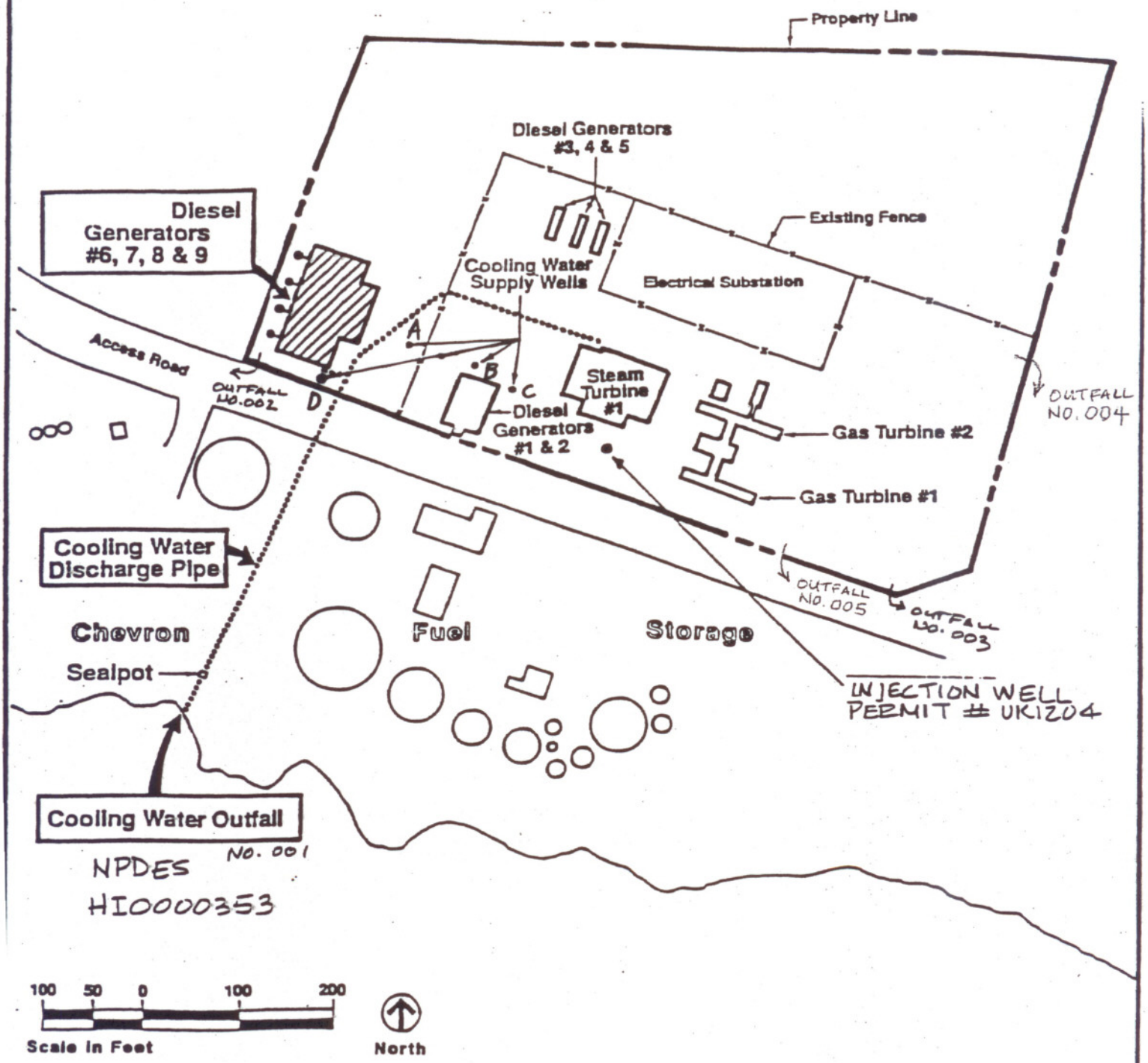
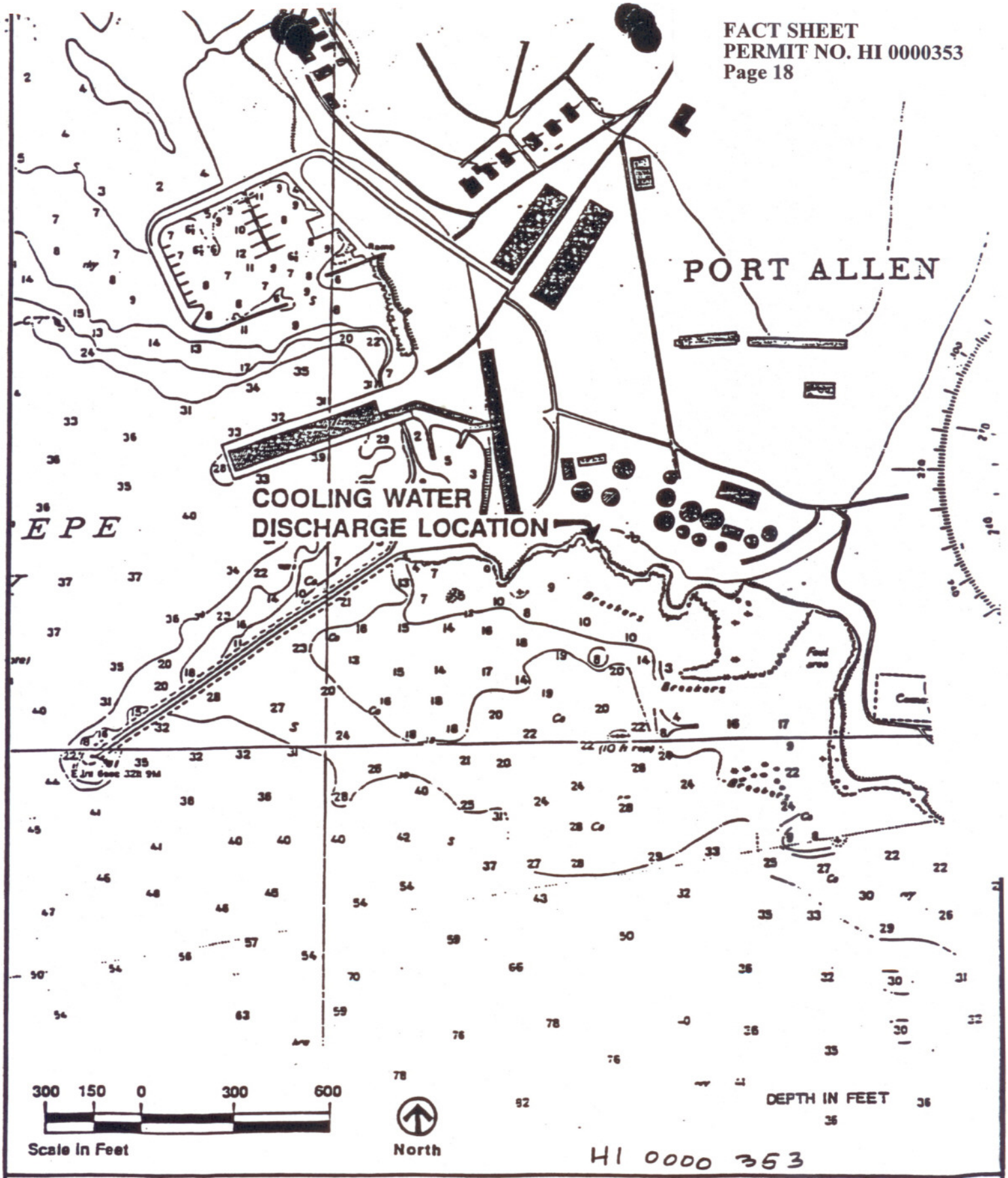


FIGURE 2



Layout of the Port Allen Generating Station and Cooling Water Discharge Pipe

Figure 3



Cooling Water Discharge Pipe and Vicinity

Figure 4

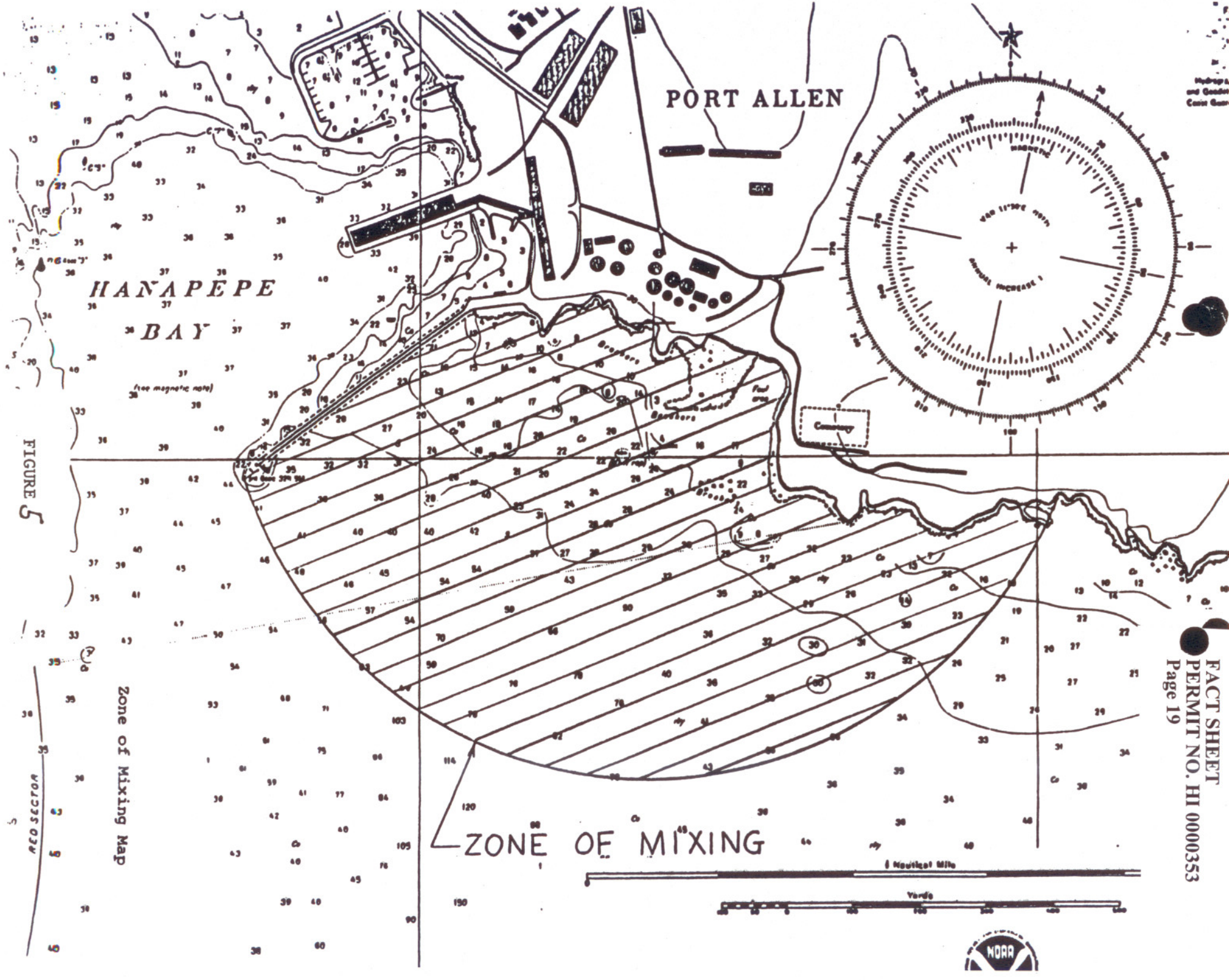

PORT ALLEN
HANAPEPE
BAY
(see magnetic note)
ZONE OF MIXING
Zone of Mixing Map
PACIFIC OCEAN
1 Nautical Mile
Yards
NOAA

FIGURE 5

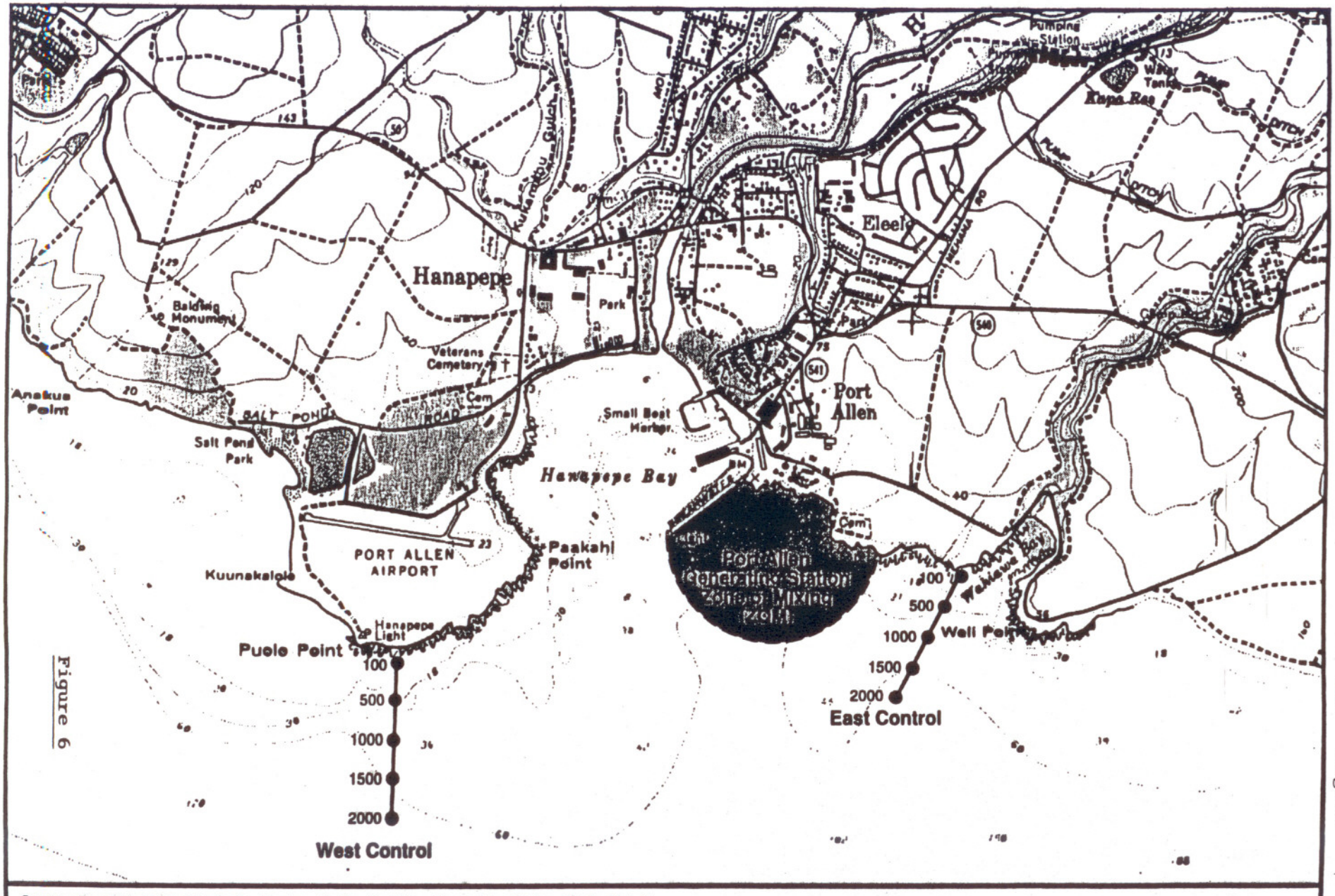


Figure 6

Source: *Receiving Water Monitoring Program for the Port Allen Generating Station, Eleele, Kaua'i, Hawai'i: Report No. IV-95.* Marine Research Consultants, November 28, 1995.

NORTH

0 500 1000 2000 4000

SCALE IN FEET

MAP SHOWING LOCATIONS OF SAMPLING STATIONS ON EAST AND WEST CONTROL TRANSECTS, AS WELL AS LOCATION OF PORT ALLEN GENERATING STATION ZONE OF MIXING (ZOM)

Prepared by Belt Collins Hawaii

433.2004001-2 n/18/96

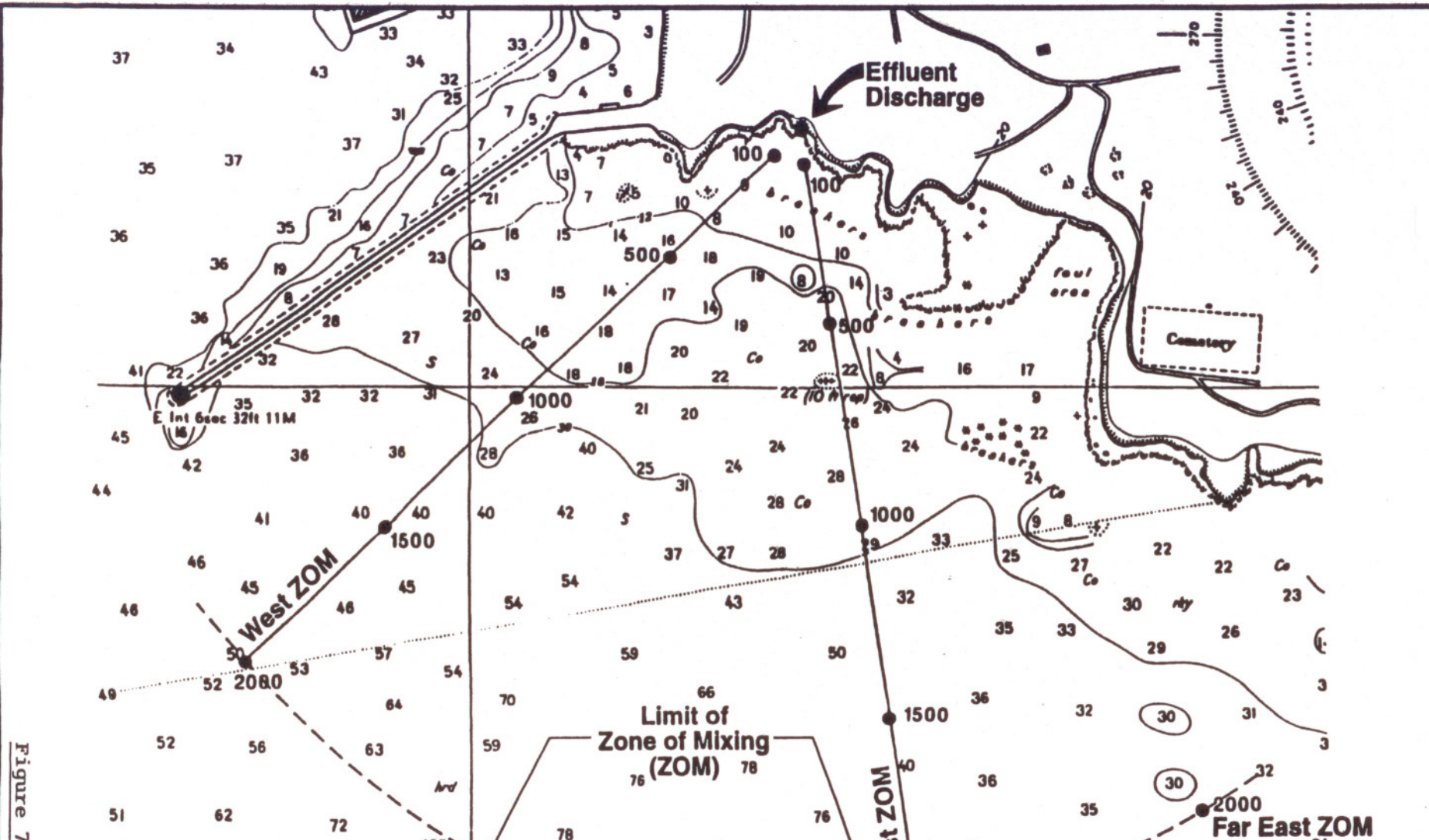


Figure 7

Source: *Receiving Water Monitoring Program for the Port Allen Generating Station, Eleele, Kaua'i, Hawai'i: Report No. IV-95.* Marine Research Consultants, November 28, 1995.

NORTH

0 100 200 400 800

SCALE IN FEET

MAP SHOWING LOCATIONS OF WATER CHEMISTRY TRANSECTS AND SAMPLING STATIONS IN THE PORT ALLEN GENERATING STATION ZONE OF MIXING

Prepared by Belt Collins Hawaii

TABLE A Geometric means of water chemistry measurements at each station and depth ottshore of the Kauai Island Utility Cooperative Port Allen Generating Station calculated from the last twelve surveys (April 2003-February 2006). For calculations of geometric means, detection limits were used for samples with data below the detectable limit. Abbreviations as follows: S=surface; M=midwater; D=deep; DFS=distance from shore. Shaded and boxed values exceed DOH geometric mean water quality standards criteria for open coastal waters under "wet" conditions which are shown in the table. For transect locations, see Figures 1 and 2.

TRANSECT	DFS (ft)	DEPTH (ft)	NO_3^- (µg/L)	NH_4^+ (µg/L)	Si (µg/L)	TP (µg/L)	TN (µg/L)	SALT (o/oo)	CHL a (µg/L)	TEMP (deg. C)	pH
EAST CONTROL	2000 S	1.0	1.74	0.39	58.53	8.68	118.57	34.877	0.11	25.63	8.16
	2000 D	74	1.60	0.31	49.72	9.22	116.83	34.949	0.11	25.41	8.16
	1500 S	1.0	1.34	0.42	51.33	9.15	123.19	34.857	0.10	25.63	8.17
	1500 D	73	1.33	0.56	44.41	9.41	124.97	34.919	0.10	25.55	8.17
	1000 S	1.0	1.51	0.52	58.38	9.11	119.35	34.860	0.11	25.61	8.17
	1000 D	61	1.31	0.51	54.06	9.32	117.75	34.924	0.14	25.55	8.16
	500 S	1.0	2.81	0.76	70.29	8.90	124.25	34.820	0.14	25.56	8.16
	500 D	56	1.53	0.71	60.61	9.01	127.29	34.496	0.14	25.56	8.16
	100 S	1.0	3.77	0.84	77.90	9.09	119.00	34.818	0.20	25.48	8.14
	100 D	19	3.30	0.67	65.92	9.06	122.97	34.882	0.22	25.49	8.14
WEST CONTROL	2000 S	1.0	0.94	1.23	46.37	8.51	129.75	34.867	0.11	25.67	8.16
	2000 D	79	0.49	0.70	43.71	9.00	124.62	34.937	0.10	25.54	8.17
	1500 S	1.0	0.62	0.60	49.18	8.93	123.40	34.859	0.11	25.62	8.17
	1500 D	75	0.71	0.56	44.51	8.72	120.57	34.946	0.11	25.53	8.17
	1000 S	1.0	1.44	1.06	57.36	8.88	120.28	34.710	0.13	25.60	8.17
	1000 D	63	0.92	0.65	48.85	9.22	136.14	34.934	0.14	25.53	8.17
	500 S	1.0	3.05	0.85	83.18	9.72	118.22	34.750	0.17	25.56	8.16
	500 D	36	1.05	0.02	69.42	9.15	130.15	34.873	0.15	25.59	8.16
	100 S	1.0	3.01	1.12	83.99	9.75	146.43	34.802	0.20	25.52	8.14
	100 D	21	2.17	0.77	74.48	9.08	130.63	34.856	0.20	25.55	8.14
EAST ZOM	2000 S	1.0	0.70	0.67	51.85	9.20	125.60	34.884	0.12	25.62	8.16
	2000 M	23	0.97	0.67	50.30	9.95	119.85	34.924	0.13	25.61	8.16
	2000 D	46	0.89	0.02	46.28	9.16	126.56	34.935	0.12	25.53	8.16
	1500 S	1.0	1.36	0.02	65.65	9.01	125.46	34.852	0.13	25.58	8.15
	1500 M	24	1.05	0.02	54.52	8.39	116.11	34.934	0.13	25.60	8.16
	1500 D	48	1.07	0.62	50.22	9.19	131.87	34.508	0.14	25.55	8.16
	1000 S	1.0	2.46	0.02	78.55	8.80	132.98	34.835	0.15	25.56	8.15
	1000 D	61	1.03	0.02	57.08	8.74	122.58	34.900	0.17	25.55	8.15
	500 S	1.0	13.92	1.14	222.53	9.73	149.53	34.698	0.19	25.53	8.13
	500 D	25	3.24	0.49	76.40	9.26	126.31	34.662	0.18	25.53	8.13
	100 S	1.0	9.80	0.95	189.09	10.17	158.58	34.752	0.23	25.56	8.11
	100 D	14	3.76	0.72	88.50	9.09	127.46	34.883	0.25	25.47	8.12
WEST ZOM	2000 S	1.0	7.75	0.88	204.50	10.40	136.39	34.385	0.25	25.45	8.13
	2000 M	23	2.57	0.58	76.73	9.44	149.14	34.922	0.19	25.51	8.15
	2000 D	46	1.33	0.03	64.98	9.44	137.17	34.936	0.20	25.45	8.15
	1500 S	1.0	8.37	0.02	151.96	9.68	158.67	34.785	0.18	25.62	8.14
	1500 M	20	2.34	0.02	70.53	9.29	138.60	34.920	0.18	25.58	8.15
	1500 D	40	1.75	0.02	64.77	9.58	139.30	34.716	0.18	25.57	8.15
	1000 S	1.0	31.45	0.64	323.03	10.63	169.35	34.492	0.21	25.66	8.13
	1000 D	33	4.73	0.87	93.54	10.32	136.47	34.877	0.24	25.60	8.14
	500 S	1.0	102.90	0.91	882.71	12.61	231.25	34.282	0.28	25.87	8.11
	500 D	14	4.35	0.81	83.53	9.97	150.53	34.876	0.27	25.52	8.13
	100 S	1.0	188.37	0.86	1,504	16.86	324.32	33.235	0.34	26.31	8.09
	100 D	13	7.28	0.87	131.88	12.05	148.57	34.875	0.31	25.52	8.12
DOH WQS GEOMETRIC MEANS			5.00	3.50		20.00	150.00		0.30		

* Salinity shall not vary more than ten percent form natural or seasonal changes considering hydrologic input and oceanographic conditions.

** Temperature shall not vary by more than one degree C. from ambient conditions.

***pH shall not deviate more than 0.5 units from a value of 8.1.

TABLE B Continuous geometric means of water chemistry measurements at each station (depths combined) offshore of the Kauai Island Utility Cooperative, Port Allen Generating Station calculated from the last twelve surveys (April 2003-February 2006). For calculation of geometric means, detection limits were used for samples with data below the detectable limit. DFS= station distance from shore. Shaded and boxed values exceed DOH geometric mean water quality standards criteria for open coastal waters under "wet" conditions that are shown in table. For transect locations, see Figures 1 and 2.

TRANSECT	DFS (ft)	NO_3^- (µg/L)	NH_4^+ (µg/L)	TP (µg/L)	TN (µg/L)	SALT (o/oo)	CHL a (µg/L)	TEMP (deg. C)	pH
EAST CONTROL	2000	1.67	0.35	8.95	117.70	34.91	0.11	25.52	8.16
	1500	1.33	0.49	9.28	124.07	34.89	0.10	25.59	8.17
	1000	1.41	0.52	9.22	118.55	34.89	0.12	25.58	8.16
	500	2.08	0.73	8.95	125.76	34.66	0.14	25.56	8.16
	100	3.53	0.75	9.07	120.97	34.85	0.21	25.49	8.14
WEST CONTROL	2000	0.68	0.93	8.75	127.16	34.90	0.10	25.60	8.16
	1500	0.66	0.58	8.83	121.98	34.90	0.11	25.57	8.17
	1000	1.15	0.83	9.05	127.96	34.82	0.13	25.56	8.17
	500	1.79	0.12	9.43	124.04	34.81	0.16	25.58	8.16
	100	2.56	0.93	9.41	138.30	34.83	0.20	25.54	8.14
EAST ZOM	2000	0.84	0.19	9.43	123.96	34.91	0.12	25.58	8.16
	1500	1.16	0.06	8.86	124.31	34.76	0.13	25.57	8.16
	1000	1.59	0.02	8.77	127.68	34.87	0.16	25.55	8.15
	500	6.72	0.75	9.49	137.43	34.68	0.18	25.53	8.13
	100	6.07	0.83	9.62	142.17	34.82	0.24	25.51	8.12
WEST ZOM	2000	2.98	0.25	9.75	140.78	34.75	0.21	25.47	8.15
	1500	3.25	0.02	9.52	145.23	34.81	0.18	25.59	8.15
	1000	12.19	0.75	10.48	152.02	34.68	0.22	25.63	8.14
	500	21.15	0.86	11.21	186.57	34.58	0.27	25.69	8.12
	100	37.03	0.87	14.26	219.51	34.05	0.33	25.91	8.11
DOH WQS GEO. MEAN		5.00	3.50	20.00	150.00	*	0.30	**	***

* Salinity shall not vary more than ten percent form natural or seasonal changes considering hydrologic input and oceanographic conditions.

** Temperature shall not vary by more than one degree C. from ambient conditions.

***pH shall not deviate more than 0.5 units from a value of 8.1.

KAUAI ISLAND UTILITY COOPERATIVE
PORT ALLEN GENERATING STATION
NPDES PERMIT NO. HI 0000353
ZONE OF MIXING NO. ZM-58

APPENDIX 2

SECTION 316(a) CWA, THERMAL EFFECTS MONITORING PROGRAM ADDITIONAL PROGRAM ELEMENTS

316(a) Thermal Wastewater Discharge Impacts: Suggested Essentials For Related Study Plans

Present/Describe Background Information:

Describe the subject facility's current, historic and future (planned) discharge operations;
Describe the environmental setting and local aquatic resources for which the subject discharge has potential impact. The description should include assessments of local/regional oceanographic, hydrologic, meteorologic, and bathymetric conditions. The description should also describe dominant biological features/communities within the sphere of the thermal discharge; and
Describe and/or detail historic/past studies which are proposed to be used to meet demonstration study requirements and purportedly characterize the physical, biological and/or environmental conditions in the vicinity of (or in relation to) the facility's wastewater discharge. Demonstrate the extent to which such data are of adequate quality/quantity to be used to meet 316(a) study plan requirements.

Thermal Wastewater Discharge Studies:

Describe/propose a study designed to adequately assess the spatial and temporal patterns of the thermal plume associated with the facility's wastewater discharge. This effort should adequately gage the general extent of the plume's variable and dominant distribution (both from two-dimensional and three-dimension perspectives) in the discharge environment both on an annual and seasonal basis;
Describe/propose a study designed to adequately measure (using accepted ecological techniques) the current distribution of the biological value(s) found in the vicinity of the discharge, both within and outside of the thermal plume's influence. As mentioned above, the collection of biological information should be obtained in such a way as to ultimately allow robust spatial and temporal comparisons of the collected data. Accordingly, the minimum number of samples collected, frequency and repetition of sampling efforts, and number and locations from where samples are to be collected (i.e., "stations") should be sufficient as to allow the application of appropriate (and robust) statistical techniques generally employed to test the relative significance of the data collected. QA/QC procedures should be developed/proposed in association with the collection, processing and analysis of any data collected for such a study;
Describe/detail scientifically acceptable methods for the collection, processing and analysis of all samples to be obtained for purposes of meeting the objectives of the study design. As part of such methods, and as mentioned above, QA/QC procedures should accompany every aspect of data collection, processing and analysis; and
Describe current or proposed biofouling control mechanisms employed by the facility to control the growth of sessile organisms on and in the facility's intake structure.

Data Analyses and Reporting:

Propose how the various groups of related and/or unrelated data will be analyzed, and if applicable, propose which statistical techniques and/or models will be employed to test differences in the data. Propose how or in what format the collected data and analytical results will be reported. Articulate problems/shortcomings experienced during implementation of the study design. A discussion of the study results should clearly lay-out the overall findings of the study efforts and also articulate the level of impact (if any) caused by the facility's thermal discharge.

General Discussion Related to 316(a) Requirements

As is the case with impacts caused by the intake of water for cooling purposes, impacts to local aquatic communities from elevated thermal discharges are literally impossible to avoid. In order to adequately gage the level of thermally-related impacts to areas/communities in the vicinity of the facility's discharge one must compare such areas with nearby or ecologically similar areas which have not been impacted/influenced by the subject discharge. Determining the extent that species composition, abundances, and diversity differs between such areas is usually the main focus of any 316(a) study.

Depending upon the actual discharge type and location, 316(a) studies generally will need to assess the status of intertidal and subtidal biological communities inhabiting areas both within and outside the influence of the thermal discharge. Whether it be permanent photo-stations, transect-quadrat methods, fish surveys, benthic grabs, etc., the same methods of measure (sampling) need to be employed at both thermally influenced and non-thermally influenced areas. Non-destructive sampling methods are usually employed when conducting such studies since the biological communities inhabiting these areas will be assessed on a regular basis over a long period of time. The involvement of expert biologists for purposes of identifying marine organisms, and their various life-history stages, is a critical part of any biological survey work performed during such studies. Species composition, abundance, and distribution patterns should ultimately be determined from such an effort, as well as the collection and archiving of a reference collection which is representative of those species sampled/observed throughout the study. Again, QA/QC procedures need to be developed in association with the application of sampling methodologies and taxonomic identification of marine organisms collected/sampled for this effort, and the "a priori" design of the sampling regime should ultimately allow for the application of rigorous statistical methods used to determine differences based on scientifically acceptable levels of significance.

The frequency, extent, and location(s) of any associated sampling/survey efforts designed to gage the composition, abundance and diversity of aquatic organisms located both within and outside the influence of the thermal discharge should take into account (a'priori) how such parameters will be tested after data is collected. Periodic and regular surveys should document/establish the condition of the biological communities living both within and outside the influence of the thermal discharge, and the extent to which such communities vary in their occurrence and abundance over time. Ultimately, the discharger should be able to ascertain (by way of their sampling efforts) the level of influence/impact the facility has had, and/or is having, on local populations of macroinvertebrates, fishes, birds, mammals, and reptiles (turtles, sea snakes, etc.).